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To Dr Osborne with best Compts from the Editor

AN
ANATOMICAL DESCRIPTION
OF THE
HUMAN GRAVID UTERUS,
AND
ITS CONTENTS.

AN

ANATOMICAL DESCRIPTION

OF THE

HUMAN GRAVID UTERUS,

AND

ITS CONTENTS.

By the late WILLIAM HUNTER, M. D.
PHYSICIAN EXTRAORDINARY TO THE QUEEN, PROFESSOR OF ANATOMY
IN THE ROYAL ACADEMY, AND FELLOW OF THE
ROYAL AND ANTIQUARIAN SOCIETIES,
&c. &c.

LONDON:

PRINTED FOR J. JOHNSON, ST. PAUL'S CHURCH-YARD;
AND G. NICOL, PALL-MALL.
1794.

TO

GEORGE FORDYCE, M. D. *&c.*

DAVID PITCAIRN, M. D. *&c.*

AND

CHARLES COMBE, M. D. *&c.*

GENTLEMEN,

As Trustees appointed by the late Dr. Hunter, to have the care of his valuable Museum, there is an evident propriety in dedicating this posthumous Treatise to you. He has given you the most unequivocal proof of his good opinion; and there are none to whom, I am persuaded, he would have been more disposed to have dedicated this little work, had he been alive.

It happens, by a lucky concurrence of circumstances, that while I am doing what I believe would have been very agreeable to the Author himself, to whom I owe every sentiment of gratitude and respect, I follow at the same time my own opinion and feelings. You have shewn me many marks of your friendship; and there are none for whose character I entertain a higher esteem.

I forbear to add any thing more. Your attainments and professional reputation need not to be told; and I am unwilling to incur the risk of offending your delicacy, and forfeiting some part of that favourable opinion with which you have always appeared to honour me, by attempting to offer what might perhaps be considered as adulation. I remain,

GENTLEMEN,

with very sincere regard, your faithful,

and most obedient servant,

Windmill Street,
Oct. 3, 1794.

M. BAILLIE.

ADVERTISEMENT.

An accurate Anatomical Description of the Human Gravid Uterus and its Contents, has not hitherto been published in this, nor I believe in any other country. It was therefore a desideratum in anatomy; and no person surely was so capable of supplying this want as the late Dr. Hunter. He had more opportunities of examining this subject than any other anatomist; it had engaged very early his attention, and he had pursued every inquiry relating to it with uncommon ardour. The result of his labour has been, that he has improved very much the knowledge of this part of anatomy, more especially by discovering the decidua reflexa, and by explaining the true nature of the decidua, as formed by the uterus, which before his time was altogether misunderstood. About twenty years ago, he published a large volume of plates to illustrate the Anatomy of the Gravid Uterus and its Contents, which for accuracy of representation, and excellence of engraving, have never been surpassed in any anatomical work. The first artists were employed, who, while they contributed to the improvement of a most interesting part of science, were ambitious at the same time of adding to their own reputation.

No regular description of the anatomy of the Gravid Uterus accompanied these plates, but the plates themselves were merely explained. Dr. Hunter had intended, however, to make up this deficiency, so as to render the whole work complete. He has made a promise to this purpose in the preface to his large volume of Engravings; and has left behind him a Manuscript containing a Description of the Anatomy of the Gravid Uterus and its Contents, which he had not quite finished. What appeared to me to be wanting, I have attempted with much diffidence to add, but this amounts only to a few pages.

It may very naturally be asked, why has this publication been so long delayed? To this question I am unable to give a satisfactory answer; but I will explain the real cause of the delay. When this Manuscript came into my hands after Dr. Hunter's death, I had studied anatomy for so short a time, and indeed was so young, as not to be capable of judging whether the Manuscript was in a state fit for publication or not. After some time it was laid by, and not taken up till lately. It then struck me, upon perusal, as not only proper to be published, but as likely to do honour to the reputation of Dr. Hunter, although already so great.

The Manuscript is probably not the copy which would have been put into the hands of the printer, had the Author himself been alive; but it is written with so much perspicuity, that he would have had very little to have corrected. I have thought it my duty to make no alteration, except when there was a very obvious reason for it; and this has happened only in a very few instances.

THE EDITOR.

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AN

ANATOMICAL DESCRIPTION

OF THE

HUMAN GRAVID UTERUS, *&c.*

SIZE OF THE UTERUS.

THE pregnant uterus undergoes such gradual changes, from the time of conception to the hour of delivery, that in giving the anatomy of this part it will be necessary to fix upon some one time in the wide period of nine months. The latter part of that period appears to be the fittest for our purpose, on many accounts, but especially because the fruit of the womb is then come to its full perfection, bears examination better, and all the minute organization is become more the object of sense and experiment. We shall therefore be supposed to be speaking of the uterus as it is in the ninth month, except the contrary be particularly expressed.

The common size of the pregnant uterus may be understood by casting the eye over the first, second, fourth, eleventh, and thirteenth plates.* To be more particular upon the size of the uterus would answer no useful purpose. And that the difference in a number of instances will be very considerable, may be readily imagined, when we reflect that the uterus very commonly contains a child and placenta, at least twice as large in one case as it does in another, and frequently at the least six or eight times more water: besides the variety of size from there being one child only, or twins, &c.

The size of the uterus appears to depend upon the quantity of the liquor amnii principally; for though women who have twins, or a very large child, are commonly observed to be very big, yet the greatest number of those who are really very much swelled out, are so only from a vast quantity of water. In such cases there is frequently but one child, and that very often a small one.

* This refers to the large volume of engravings, illustrating the Anatomy of the Gravid Uterus, which was published by the author about twenty years ago; and a similar reference is made in some other parts of this Treatise.

FIGURE OF THE UTERUS.

The general figure of the uterus is oviform; the fundus answering to the largest extremity of the egg, and the cervix and os uteri to the small end: but the fundus is larger and more flat, or less pointed, in proportion to the lower extremity of the uterus, than one end of an egg is to the other; and the whole uterus seems more or less compressed, so as to be broader from right to left, than it is from the fore part backwards. Besides these more constant deviations, the figure of the uterus differs from the regular oviform, from a variety of accidental causes, as it adapts itself to the neighbouring parts, to the attitude of the body, and to the position of the contained child. In order to conceive these varieties more easily, we must remember that in most cases the uterus is not so completely filled as to be upon the full stretch. Were it out of the body, and filled artificially, it would easily contain more than it actually does. Thus the uterus, like a bladder of water not quite full, is plastic, and moulds itself into various shapes from accidental circumstances.

As the surrounding parts resist the pressure or weight of the uterus unequally, according to their different natures, the uterus swells out in some places, while in others it is pressed inwards. Thence it is, that the brim of the bony pelvis has commonly the effect of a belt girding that part of the uterus, and the projections of the spine, and of the psoæ and iliac vessels, mould the outside of the uterus into corresponding cavities.

That the different attitudes of the mother's body should produce alterations in the figure of the uterus, needs not now a particular explanation or proof. The weight of the uterus itself, and of the adjacent viscera, being differently directed, must produce some change in the form of the uterus corresponding to every change of posture, especially as the parts against which the uterus will rest its weight, in the different postures of the body, are of such different natures.

The same plastic state of the uterus makes it adapt its figure to the circumstances of the child within, and vary as those change. We not only in dead bodies see the parts of the child making a variety of different projections on the outside of the uterus; but in the living body, all the same variety is frequently manifest to the touch, in examining the outside of the abdomen. The round projecting ball made by the child's head or buttocks, is commonly very perceptible, and in many instances smaller projecting parts are so distinctly felt through the containing parts of the abdomen, as to leave no room to doubt of their being knees or elbows. The most extraordinary instance which has come to my knowledge, of the uterus shaping itself to its contents, was a case of twins which Dr. Mackenzie shewed to me, and which, with many other curious and useful observations, which an indefatigable diligence in his profession had furnished him with, it is to be feared are already in some measure lost to the public. In this case, the twins with their involucra and waters, did not make one compacted oval body as usual, but the uterus had stretched into two distinct bags for containing the respective twins; so that upon the outside of the uterus there was a notch dividing it into two apartments, as deep and distinct, in proportion, as the base of the heart represented on cards.

In several cases I have observed the uterus to stretch unequally in the corresponding opposite parts; so that one half, either right or left, has been considerably larger than the other. And in two cases I found the anterior part of the uterus much more swelled out than the posterior, so that the distance from the insertion of one Fallopian tube to the other, measured much less upon the back part than upon the fore part of the uterus; and in some cases the reverse has been as evident.

The human uterus, in the unimpregnated state, commonly has one triangular cavity. In many instances it is found subdivided, at its upper part, into two lateral cavities, so as to resemble the two horns of the uterus in a quadruped. Several specimens of such uteri are preserved in my collection. That peculiarity will perhaps explain the unequal extension of the two sides, right and left, in some instances of pregnancy; and may likewise explain this very singular case of twins which Dr. Mackenzie met with: we need only to suppose that the uterus had originally been subdivided into two horns, and that each ovarium had furnished a fœtus, which was deposited in the respective side or horn of the uterus, as in the quadruped.

Upon the whole, we may say that an egg is no more like the form of the human uterus, than a cylinder like the beautifully varied figure of the trunk of the human body. It must be observed likewise, that the cavity does not always correspond with the outward figure of the gravid uterus. In one instance which I met with in a dead body, and still preserve, and in another, which I was very sensible of in a living woman, a part or band of the inner stratum of the flesh of the uterus had not stretched in the same degree with the rest, but made a considerable partition internally; a circumstance which might have increased the difficulty, as well as the danger of rudely turning the child, or taking away the placenta with the hand.

SITUATION OF THE UTERUS.

The small or lower end of the uterus is placed in the cavity of the pelvis. This generally contains the greater part of the child's head, and fills up the cavity of the pelvis so completely, as to press the vesica urinaria against the symphysis pubis, and the rectum against the hollow of the sacrum. The os uteri is directed against the coccyx, or the lower part of the sacrum. The body and fundus of the uterus, which for the most part contains all the rest of the child and the placenta, is so placed in the anterior part of the abdomen, from the brim of the pelvis upwards to the epigastric region, as to be under and before all the other bowels in immediate contact with the parietes abdominis, occupying the whole space from one hip bone to the other, and a proportionable space from these bones upwards as far as the epigastric region. The common situation of the uterus will be perfectly understood by looking at plate first, second, third, and fourth.

When the uterus rises up from the cavity of the pelvis into the hypogastric and umbilical regions of the abdomen by its increasing bulk, it is no wonder that it should instantly mount up before the small intestines. Their attachment to the loins by the mesentery, would seem to render this necessary; but there is another cause which co-operates towards this effect, and which almost as certainly prevents the epiploon from falling down before the uterus, though that membrane is naturally so loose, that we might conceive it to be spread out indifferently either before or behind the body of the uterus. Yet in fact this fatty membrane is commonly found pushed up by the uterus, and crowded all round the fundus uteri, with the small intestines in the epigastric and adjacent parts of the hypochondriac regions. The cause of all this would appear to be the specific lightness of those parts in comparison of that of the uterus. The intestines contain some air, and the epiploon a good deal of oil, which gives them lightness, and buoys them up above the uterus.

Whoever has any tolerable notion of the shape of the abdomen, and situation of the cavity of the pelvis, must understand that the axis of the uterus is very far from the perpendicular line, its lower end being turned backwards, and its upper end in proportion turned forwards. This obliquity changes with the attitude of body, and from many other causes. When erect, the weight of the uterus presses the fore part of the abdomen into a greater rotundity, and then the axis of the uterus approaches nearest to the transverse or horizontal line; and in a recumbent posture, the contrary happens from a similar cause.

In the case of a first pregnancy, the uterus stretches itself higher up in the epigastric region, and its axis comes nearer to the longitudinal or vertical direction, because the parietes of the abdomen do not easily give way, and do not swell forwards in any great degree; but in a woman who has had many children there is a more loose and pendulous abdomen, and thence the uterus does not shoot upwards, but rather forwards, and takes more of the transverse situation. This oblique direction of the uterus approaching to the transverse, is more remarkable in very short women; because in them the chest is so near the pelvis that the uterus is stopt in its ascent, and forced to shoot forwards. The same thing happens, and for a like reason, when the pelvis is very narrow. For in this case the uterus must be higher, as no part of it can be lodged in the cavity of the pelvis. In a very short and crooked woman, with a very narrow pelvis, upon whom I saw the Cæsarian section performed, from a concurrence of the abovementioned causes, the fundus uteri was turned not only forwards, but even a little downwards. As she lay upon the table, the navel and upogastrium could not be seen; the navel being situated on what might have been called the posterior and inferior part of the abdominal tumour. And to expose that part of the abdomen to the surgeon, it was necessary with two assisting hands to lift up the fundus uteri, or the most prominent part of the abdomen; without which the hypogastric region would have been inaccessible. Indeed, it was an appearance which, without having seen it, I should never have conceived.

The obliquity of the uterus towards the right or left side is not commonly, indeed cannot be, very considerable. When it is of such a size as to possess the whole, or nearly the whole space between the hip bones, and its lower extremity is fixed down to the pelvis, how is it possible that it should be turned very considerably to one side? A small degree of lateral obliquity is very common; and it is natural to suppose that in a reclined posture, the middle projection of the lumbar vertebræ will throw a little more than one half of the uterus into the lateral cavity between the spine and one hip bone. In fact, we know that in all the last months of utero-gestation the abdomen is often more full on one side than on the other. Women say in such a case, that the child lies on one side; and they judge rightly. Where the child lies, the bulk must both be more considerable and more permanent; but where there is only uterus, placenta, and water, the swelling will be softer, and project less.

When the child lies more in one side than in the other, I have frequently observed that the limb of that side is weaker, more benumbed, and more liable to cramps and œdematous swellings. That an awkward position of the child will occasion spasms in the limb, experience testifies with the clearest evidence. Many women feel that the one depends upon the other; and from particular motions of the child, can certainly prognosticate ease or pain till it shall alter its situation again.

As far as I have been able to observe, the mere obliquity of the uterus never occasions so difficult a labour, as to require any artful management to bring the os uteri into a proper situation. In such cases, as in many others, art can do little good, and patience will never fail.

Whoever understands the figure and situation of the uterus in the last months of gestation, will see that in that period a case of pregnancy may commonly be distinguished from other swellings of the abdomen, by outward examination alone. The flatulent softness, and, when struck, the peculiar sound of the bowels round the uterus, the circumscribed tumour which the uterus forms, and the unequal resistance which it makes when you press upon the child, or upon the waters, are commonly, all taken together, so characteristic, as hardly to leave an experienced and attentive examiner in doubt.

OF THE LIGAMENTS, TUBES, AND OVARIA, OF THE PREGNANT UTERUS.

It is a common observation, that the ligaments and tubes of the pregnant uterus are attached lower upon the side of the uterus than they were before pregnancy. If the reason of this has not been so generally known, it is nevertheless evident. The peritonæal coat of the uterus makes the broad ligament on each side, much in the same manner as the analogous membrane of the intestinal tube makes the mesentery. When a woman is not pregnant this ligament is of considerable breadth, the spermatic vessels pass between its two laminæ, the round ligament runs downwards, and outwards, on its anterior surface, and the tube runs in loose serpentine turns upon its upper edge.

But in proportion as the circumference of the uterus grows larger, the broad ligaments grow narrower, their posterior lamella covering the posterior surface, and their anterior lamella covering the anterior surface of the uterus itself. As a proof of what has been said, we observe that the round ligaments do not now run down on the fore part of the broad ligaments, but upon the fore part of the body of the uterus itself; a proof, I say, that the peritonæum, which covers the uterus at this part, is the very membrane which before pregnancy made the anterior lamella of the broad ligament. Farther, in proportion as the fundus uteri rises upwards, and increases in size, the upper part of the broad ligament is so stretched that it clings close to the side of the uterus, so that in reality the broad ligament disappears, no more of it remaining than its very root; viz. its upper and outer corner, where the group of spermatic vessels pass over the iliacs immediately to the side of the uterus. In this state, though the small end of the tube opens into the same part of the uterus, as before impregnation, yet the tube has a very different direction; instead of running outwards in the horizontal direction, it runs downwards, clinging to the side of the uterus. And behind the fimbriæ lies the ovarium, for the same reason, clinging close to the side of the uterus. The fimbriæ and ovarium are commonly placed upon the iliac vessels, or fleshy brim of the pelvis, behind the group of spermatic vessels.

The round ligaments run almost perpendicularly downwards from the fundus uteri to their passage through the muscles; they are considerably enlarged in thickness, and are so vascular, that when injected, they seem to be little more than a bundle of arteries and veins. Their arteries are all convoluted. Both their arteries and veins are branches principally of the spermatics, and both evidently anastomose with their respective external vessels in the groin, or upper part of the labia. Even in this enlarged state of the round ligaments, it is very difficult to say how they terminate in the groin; they appear to be insensibly lost.

The tubes are more fleshy, vascular, and soft in their substance, and are less convoluted than in the unimpregnated state. The fimbriæ and internal rugæ are larger and much more beautiful, especially when their vessels are well injected.

The ovaria seem to have undergone no remarkable change, except that one which contains the corpus luteum ; which for the most part can be distinguished by a rounded fullness, and frequently a considerable prominence, sensible both to the sight and touch, upon the middle of which there is a small pointed cavity or indentation like a cicatrix. Upon slitting the ovarium at this part, the corpus luteum appears a round body, of a very distinct nature from the rest of the ovarium. Sometimes it is oblong or oval, but more generally round. Its centre is white, with some degree of transparency ; the rest of its substance has a yellowish cast, is very vascular, tender, and friable, like glandular flesh. Its larger vessels cling round its circumference, and thence send their smaller branches inwards through their substance. A few of these larger vessels are situated at the cicatrix or indentation on the outer surface of the ovarium ; and are there so little covered, as to give that part the appearance of being bloody when seen at a little distance. When there is only one child, there is only one corpus luteum ; and two in case of twins. I have had opportunities of examining the ovaria with care in several cases of twins, and always found two corpora lutea. In some of these cases there were two distinct corpora lutea in one ovarium ; in others, there was a distinct corpus luteum in each ovarium. In a variety of different cases, I have found that the sex of the fœtus has no relation to the corpus luteum being in the right or left ovarium.

OF THE THICKNESS OF THE UTERUS.

Those who say that the uterus grows thicker in the same proportion that its bulk is increased, have probably been deceived by examining the uterus of a woman who died some hours or days after delivery. In that contracted state the uterus is often found even two inches thick ; but in all those which I have examined, in the natural distended state, though there was some difference, the thickness of the uterus was but a little more considerable than before impregnation. When not injected, its more common thickness is from one to two-thirds of an inch ; when its vessels, and particularly its veins, are pretty well filled with wax, its thickness is thereby considerably increased, more especially where the placenta is fixed, on account of the number and size of the vessels at that part. For this reason only, perhaps, the uterus is thickest at that part, and for this reason too it is commonly thicker towards the fundus than near the cervix. In respect of thickness, I have observed a good deal of variety, and such inequalities in the same uterus, that even where the placenta did not adhere, the uterus has been almost twice as thick at one part as at another. I have always observed in opening the uterus, that its thickness is more considerable than one could have imagined it to be by feeling it externally, where there is a fluctuation of the water. Its substance is so soft, that the fluctuation then felt is like that of water in a thin bladder.

OF THE BLOOD VESSELS OF THE UTERUS.

There is no circumstance in which the gravid uterus differs more from the unimpregnated, than in the size and termination of its vessels. The arteries, both spermatic and hypogastric, are very much enlarged. The hypogastric is commonly considerably larger than the spermatic, and we very often find them of unequal sizes in the different sides. They form a large trunk of communication all along the side of the uterus; and from this the branches are sent across the body of the uterus, both before and behind. The cervix uteri has branches only from the hypogastrics, and the fundus only from the spermatics; or in other words, the hypogastric artery gives a number of branches to the cervix, besides sending up the great anastomosing branch, and the spermatic artery supplies the tube and fundus uteri before it gives down the anastomosing branch on the lateral parts of the uterus. All through the substance of the uterus there are infinite numbers of anastomosing arteries, large and small, so that the whole arterial system makes a general net-work, and the arteries are convoluted, or serpentine, in their course. Hardly any of the larger arteries are seen for any length of way upon the outside of the uterus. As they branch from the sides, where they first approach the uterus, they disappear by plunging deeper and deeper into its substance.

The arterial branches which are most enlarged, are those which run towards the placenta, so that wherever the placenta adheres, that part appears evidently to receive by much the greatest quantity of blood; and the greatest number both of the large and small arteries at that part pass through the placenta, and are necessarily always torn through upon its separation.

The veins of the uterus would appear to be still more enlarged in proportion than the arteries. The spermatic and hypogastric veins in general follow the course of the arteries, and like them, anastomose on the side of the uterus. From thence they ramify through the substance of the uterus, running deeper and deeper as they go on, and without following precisely the course of the arterial branches. They form a plexus of the largest and most frequent communications which we know of among the vessels of the human body. And this they have in common with the arteries that their larger branches go to, or rather come from, that part of the uterus to which the placenta adheres; so that when the veinous system of the uterus is well injected, it is evident that that part is the chief source of the returning blood. Here too, both the large and small veins are continued from the placenta to the uterus, and are always necessarily broken upon the separation of these two parts. The veins are without valves, and are therefore easily injected. In injecting them, we observe that at first they become turgid, and project on the outer surface of the uterus; but in proportion as we throw a greater quantity of wax into these vessels, they grow more flat and obscure; because the uterus itself becomes more filled and tense, which has the effect of compressing the veins that run in its subſtance. As I know no reason for calling the veins of the uterus sinuses, and as that expression has probably occasioned much confusion among the writers upon this subject, I have industriously avoided it.

OF THE LYMPHATICS.

Mr. Cruikshank is the first who observed at this school of anatomy the lymphatics in the gravid uterus; he also injected them with mercury, and traced them with great success in several subjects. They are more numerous, and many of them larger than could have been imagined; from which it is manifest, that a copious absorption is carried on in the uterus towards the mother. The lymphatics pervade its substance universally; its peritonæal coat appears, like that of a calf's spleen, to be interwoven with a crowded plexus of these vessels; and where they get to the sides of the uterus, when filled with mercury, some of them are even larger than a goose-quill. Some are remarkably varicose, or enlarged at particular places. They pass from the sides of the uterus, many with the spermatic vessels, but the greater number and the larger with the hypogastrics. Of these last, some pass into glands on the side of the vagina; others meet with no glands till they have reached the side of the pelvis, where they run into the glands of the iliac plexus, or shoot backwards into the glands of the sacral plexus; from both of which they pass into the lumbar plexus, where they are lost among the absorbents of the lower extremities, and the external parts of generation.

Besides the lymphatic vessels of the uterus, there are others, as we hinted above, belonging to the ovaria and Fallopian tubes, which follow the course of the spermatic arteries and veins. They anastomose with the lymphatics of the uterus, and terminate in glands which are placed upon the sides of the lumbar vertebræ, near the origin of these blood vessels. Here they become mixed with the lymphatics of the lumbar plexus, and enter along with them into the lower end of the thoracic duct. The spermatic lymphatics enlarge during pregnancy in the same manner as the blood vessels; and for this reason they are then both most readily seen and injected.

The reason why the blood vessels, lymphatics, and nerves of the ovaria and the Fallopian tubes, have their origin in the loins, is the same with that of the origin of similar vessels and nerves in the male. The ovaria and Fallopian tubes are not placed in the cavity of the pelvis in the early fœtal state, but upon the psoæ muscles, some little way under the kidneys. It is natural, therefore, that their vessels and nerves should arise near the vessels and nerves of these organs.

OF THE NERVES.

I cannot take upon me to say what change happens to the system of uterine nerves from utero-gestation, but I suspect them to be enlarged in some proportion as the vessels are. Upon this occasion we profess only to give the anatomy of the gravid uterus; yet since the descriptions of the nerves of the uterus which I have read, seem to me unsatisfactory, I shall so far go beyond my subject as to describe the hypogastric nerves, such as they appeared to me in a female subject carefully dissected for that purpose. All the uterine nerves come from the intercostals, and pass in the form of plexuses with the blood vessels, as in the other abdominal viscera; so that there is a spermatic and hypogastric plexus of each side attending the vessels of the same name. They are principally the branches of two large cords of the intercostals, which run down before and on each side of the aorta in the abdomen, much in the same manner as the trunks of the intercostals run down upon the sides of, and behind, that artery. On the left side this large cord comes down from the semilunar ganglion, partly as a continuation of the anterior cord of the intercostal from that part where it is forming the semilunar ganglion, and partly as a plexus of nervous filaments coming down more forwards from the ganglion itself. This cord passes down before the beginning of the renal artery, all along the side of the aorta. In its way it receives branches from the intercostal, and gives off branches, so that it has the appearance of a plexus, though the principal cord can always be distinguished.

It gives off the renal plexus, which is situated upon the side of the uppermost vertebra lumborum, and passes to the sinuosity of the kidney, behind the renal vein; but both before, and behind, and above, and below, the renal artery.

Opposite to the third vertebra lumborum, the cord gives off two pretty large branches, and some small filaments of nerves, which run down with and before the spermatic artery. This spermatic plexus may be distinctly traced, with the artery, into the ovarium and adjacent parts, at the upper part of the broad ligament.

Immediately below the origin of the spermatic plexus, opposite to the same third vertebra lumborum, two large branches come from the trunk of the intercostal nerve, in the common direction of these communicating branches; viz. forwards, downwards, and inwards, which join the great cord, and make it larger from this conjunction downwards.

On the right side the cord comes down from the semilunar ganglion, close to the root of the superior mesenteric plexus and artery, giving a few branches only to the renal plexus, and runs down on the right of the aorta, as the other on the left.

And on the right side the renal plexus, which comes chiefly from the semilunar ganglion, as it passes towards the kidney, behind the vena cava and renal vein, the renal plexus, I say, sends down the spermatic plexus behind the beginning of the renal, which soon joins and passes with the spermatic vessels of this side.

The two cords, right and left, may be said to constitute a lumbar plexus all along the aorta, which makes the basis of the plexuses which accompany the branches of that artery ; or they may be considered as the anterior cords of the intercostals in the abdomen.

At the upper part of the fourth vertebra lumborum, the right cord gives down a considerable branch with the iliac artery, which branching, forms a kind of sheath-like plexus upon the artery in its way to the groin.

At the bifurcation of the aorta, the right and left cord unite upon the fore part of the aorta, and make a plexus from that part directly downwards as far as the lower part of the fifth vertebra lumborum, and then finally divide into what we may call the right and left hypogastric nerve.

On the right side a pretty large branch comes from the trunk of the intercostal, on the side of the fourth vertebra lumborum, which passing downwards, and inwards behind the right iliac artery, joins the plexus of the two united cords before the last vertebra lumborum.

The hypogastric nerve passes round the side of the pelvis, between the peritonæum and the hypogastric vessels, and upon the inside of the ureter. At the middle of the side of the pelvis, where the hypogastric vessels divide, the nerve splits into a double range of branches ; viz. posterior and anterior.

The posterior range goes to the side of the rectum, some branches passing to the back part, and others to the fore part, of the gut ; and the first and uppermost of those branches are manifestly reflected upwards upon the gut, directing their course towards the colon.

The anterior range of branches is the largest, and may be considered as the continuation of the trunk of the hypogastric nerve, in the form of a plexus. Where the hypogastric vessels are passing to the side of the uterus and vagina, this nerve, situated behind them, spreads out in branches like the portio dura of the seventh pair, or like the sticks of a fan, with many communications which are sent to the whole side of the uterus and vagina. The uppermost branches pass upwards, in the duplicature of the broad ligament, towards the fundus uteri. The branches, as they go to lower parts of the organ, pass less obliquely, then horizontally, and the lowest of all run downwards on the side of the vagina. The greatest crowd or number of these branches go to the os tincæ, and the adjacent parts of the uterus and vagina.

OF THE MUSCULAR FIBRES OF THE UTERUS.

The substance of the uterus is rendered remarkably soft and loose in its texture by pregnancy ; so that when an incision is made into it, the wound can easily be made to open wide ; or if a narrow piece of the uterus be cut quite out through and through, it is so loose and ductile, that it can be readily drawn out to at least double its natural thickness. This laxity appears to depend on two causes, viz. the great quantity of large vessels in its composition, and the loose connection between the fasciculi of its fibres. It would seem probable that utero-gestation enlarges the cellular connecting membrane, as well as the vessels of the uterus.

When we speak of the muscular fibres, it is difficult to treat the subject with precision. We neither know their external appearance, nor their internal composition. They only manifest themselves to our senses, when numbers of them are collected into bundles, and make what we commonly call muscular fasciculi. In living bodies they manifest themselves by motion in the part, which we suppose is produced by a contraction or accurtation of the fibres themselves; but that change in the nature of a muscular fibre, which is the cause of its contraction, is not known. This contraction in some parts is voluntary, in others is involuntary, and in some it is both. In some parts it is quick, and in others very slow. The motion which is actually observed in the uterus of living women, is involuntary and slow. It is commonly believed to be muscular motion, and the fibres peculiar to the substance of the uterus are believed to be muscles. In the quadruped, the cat particularly, and the rabbit, the muscular action, or the peristaltic motion of the uterus, is as evidently seen as that of the intestines, when the animal is opened immediately after death. In many parts, particularly of the internal surface of the uterus, these fibres have the same striking fasciculated appearance which we observe in common muscles; yet they are of a paler colour, and appear to me to be of a harder texture. When we know more of the nature of muscular fibres, we shall perhaps be able to account for this variety. I have taken considerable pains to trace the arrangement of the uterine fasciculi, but except upon its inner surface, I have observed nothing but irregularity and confusion. On the inner surface itself, I have observed some variety, and always where the placenta adheres, a good deal of irregularity.

In a woman who died seven days after delivery, I gave up the uterus to this pursuit, and examined the fibres very carefully. I stretched it gradually in warm water, then inverted it, to have a full view of its inner surface. The remains of the decidua had been melted down, and passed off with the lochia, so that the fasciculated stratum of muscular fibres appeared to be bare, and to make the internal surface of the uterus. In a great number of places, but particularly where the placenta had been fixed, the fasciculi left oval spaces between them for the passage of arteries and veins, somewhat like those separations in the tendinous fibres of the abdomen and loins, where vessels pass out to the cellular membrane and integuments. The cervix uteri, where the penniform rugæ are situated, had not such regular nor so large fasciculi as the rest of the uterus. In the body of the uterus the fibres were very regularly circular. The fundus was made up of two concentric circular plains of fibres, at the very centre of which was the orifice of the Fallopian tube. The better to conceive this arrangement of the internal muscular fibres, we may suppose each corner of the fundus uteri, where the tube is inserted, to be stretched or drawn out, so as to make two horns, or a bifid fundus, as in the quadruped; then if we understand the inner fibres to be circular in every part of the uterus, we understand clearly how they will be circular in the human uterus upon its body, and likewise circular and concentric at each corner of the fundus.

When this internal stratum was removed, the fasciculated appearance and regular direction of the fibres was less and less apparent, in proportion as I dissected outwards; which seemed in a great measure to be owing to the infinite number of the branches and communications of the large veins.

The outer stratum in general was firmer and less vascular; that is, had fewer large vessels, and therefore was more dense than the middle and inner stratum. But the lateral parts of the uterus, where both the spermatic and hypogastric vessels first come to it, and anastomose upon its outside, are excepted in this general observation.

I afterwards had the most favourable occasion that could be desired, for examining the fibres upon the inside of the uterus. It was the uterus of a woman who died at the end of the ninth month, without being in labour, and without having any flooding or discharge of waters. When I had examined and taken out all the contents, I attended particularly to the internal surface of the uterus. I found it every where covered with a thin stratum of the decidua, through which the muscular fibres appeared, but with some degree of obscurity. Upon rubbing off this tender membrane with a cloth, it gave me pleasure to see how exactly the above description agreed with the appearances. And it is my opinion, that whenever a fair opportunity for examination presents itself, it will be found more accurate to say, that there are two than that there is one musculus orbicularis in fundo uteri. Ruysch's figure will be found to be a tolerable representation of either, and the orifice of the Fallopian tube will appear in the centre of each.

OF THE MOUTH OF THE UTERUS.

The mouth of the uterus differs considerably in the different times of utero-gestation. For the greatest part of the nine months, that is, till the cervix uteri be fully distended, there is a projection of both the anterior and posterior lip of the os tincæ; and in some women this continues till the very time of labour. But in most women, when they are at their full time, or very near it, the os uteri is flat, and makes only a small rugous hole, often not readily discoverable by the touch on the lower or posterior part of the rounded lower end of the uterus. The border of this orifice, and the internal surface of the uterus, for an inch or more all around, is full of little irregular cavities. These contain a tough gluten, which shoots across, and plugs up the inner part of the orifice. This gluten is commonly squeezed out from all the lacunæ, by the dilatation of the os uteri in the beginning and progress of the labour ; and so losing its hold, it falls out. In the dead body, when the part is kept some days in water, the gluten swells out more and more from all these cavities, and then separates entirely. Then the innumerable lacunæ which contained it being empty, are very visible. And if the gluten has been thus carefully taken away, and be floated in water, its external surface is seen beautifully ornamented with all the processes which were drawn out of the innumerable lacunæ.

OF THE CONTENTS OF THE PREGNANT UTERUS.

The contents of the pregnant uterus are the secundines, liquor amnii, and the fœtus. The secundines make the lining of the uterus, and the immediate covering of the child; they form the chain of connection and communication between the bodies of the mother and child, and carry on that wonderful influence upon which the life and health of the child depend. There is an obvious division of them, into the navel string, the placenta, and the membranes.

A peculiarity in the secundines with regard to their substance is likewise very obvious. They are all more or less gelatinous and transparent; and there is no manifest fibrous texture in any part of their substance. Their texture is adapted to the temporary purpose which they serve.

Another peculiarity in the secundines is, that there is not any appearance of fat in them, let the mother or child be ever so adipose, at any period of utero-gestation, neither in the sound or natural, nor in the morbid state of parts. What, upon a careless examination, appears to be fat upon the inner surface of the placenta in many cases, is an accumulation of a substance somewhat like a tough jelly, with an opaque and yellowish cast; and what often appears like slender ramifications of fat upon the outer surface, in reality is not fat, but ossifications in that part of the decidua.

The navel string is a cord made of three large vessels twisted together, which at one end is fixed to the child's navel, and at the other to the placenta. It passes, through the liquor amnii, from the child to the rest of the secundines. It is sometimes little more than a foot in length, and sometimes even more than four feet long. Its more common length is about two feet. When very long, it is generally entangled round the child's neck. I have known it turned four times and an half round the neck. I can hardly say that I ever saw an instance of a natural labour being in any degree retarded or rendered difficult by the shortness of the navel string, or by its being twisted in coils round the child's neck. The probable reason for the latter is, that in such cases there is a proportionable redundancy of length in the string, which we may suppose had lain in convolutions at the depending part, and that the child's head gavitating to the same place, had thereby insinuated itself into the centre of the coils, and so given them an opportunity of slipping over it, and of being caught, in labour at least, upon the neck. Where a child is turned indeed by the hand of an operator, the navel string will often be so entangled as to occasion real difficulties. The thickness of the navel string is likewise various, not only from the vessels being full of blood, or empty, but from the different size of the vessels themselves, and more especially from the different quantity of the gelatinous substance which connects them. In some it is only of the size of a small finger, in others it is thicker than a large thumb.

The three vessels of the navel string are two arteries and a vein. I have seen several cases where there was only one artery, and it was always in proportion larger. I never saw two veins: in cases of a single umbilical artery, I had supposed that the two hypogastrics of the fœtus had united at the navel to form one trunk; but in one fœtus of this kind which we dissected, the hypogastric artery of one side was not reflected to the navel, but produced only such branches as remain pervious in the adult. The umbilical vessels give off no visible branches till they come to the placenta. There the two arteries anastomose, commonly by a cross canal, nearly of the size of one of the arteries.

There is a great variety in the twisting of the vessels of the navel string. Sometimes they are uniformly and closely twisted, like a rope, in their whole course; and sometimes they run almost quite straight and parallel, especially in that part of the string which is towards the placenta; for near the fœtus it is almost always more or less twisted. In some navel strings there is great irregularity from solitary turnings of particular vessels, commonly called knots, as we see in twisting a cord where some of the constituent threads are longer, and therefore looser than others. The end of the navel string which is next the placenta is always less twisted, and more uniform than the end which is towards the fœtus.

Whatever be the cause, in most which I have attended to, the twisting of the navel string has been in the same direction, viz. such as would be produced in turning the child round upon the navel as a centre, by pushing its head towards the right side and its feet to the left. In two-and-thirty preparations now before me four only are twisted the contrary way; and of the twenty-eight which are twisted in the common way, three have the contrary twist, for some inches, at the extremity which was towards the fœtus. The coat or covering of the navel string, which has a smooth or polished surface, is composed of the united membranes amnion and chorion, and is almost inseparably joined with the parts which it incloses. The ligament which goes from the bladder of the fœtus to its navel, between the umbilical arteries, commonly called the urachus, or its remains, grows more slender as it passes along. In the navel string it is hardly perceptible, except near the fœtus. It is like a fine thread, a little more white and opaque than the rest. When you have found it near the fœtus, by taking a little pains you may trace it sensibly almost the whole length of the string. Mr. Cruikshank first observed this to me. Besides the vessels, the remains of the urachus, and coat of the navel string, I have observed nothing in its composition but a fine cellular substance loaded with a transparent ropy fluid, which gives the part both firmness and bulk. By touching the cut surface of the fresh navel string, and removing the finger slowly, we see the fluid so tenacious and ductile, as to be drawn out into fine threads some inches in length. If the navel string be kept some days, its fluid loses entirely that glutinous quality, and transudes like water; for which reason the string becomes then supple, and loses greatly of its bulk. In this state, if a small blow-pipe be pushed into the interstices of the vessels, and proper ligatures be made, the whole interstícial substance may be rendered emphysematous and white, like a piece of inflated fresh lungs. In this condition it may be dried, and then cut up to shew more distinctly the cellular substance. The great variety that is observed in the thickness or size of the navel string in different parts and in different cases, depends principally on the quantity of the cellular substance, and not on the bulk of the child.

The winding course of the vessels in the navel string we may presume, prevents their being much affected by any stretching force, and the firmness of the interstícial substance protects them against dangerous compression. These accidents might otherwise perhaps have occasioned frequent mischief, especially where there is a large child, and a small quantity of the liquor amnii. In such a case the navel string passing under the arm or ham, or in the groin, might have been compressed so as at least to have prevented the return of the veinous blood. The same thing might have easily happened in those cases where there is actually a knot formed upon the navel string, while the child is in the womb; and that such a case sometimes happens I can hardly doubt. If I have not been deceived, I have twice seen it.

OF THE PLACENTA.

The placenta and the membranes together, make one complete unimperforated bag, which lines the uterus, and contains the child. The placenta is thick, fleshy, and exceedingly vascular; the membranes are thin, pellucid, and for the most part have scarcely any apparent red blood vessels.

The figure of the placenta is commonly round and flat, about an inch in thickness, and a span in breadth. It becomes gradually thinner all around at its edge, so as to render the change from the placenta to membranes more imperceptible. The above mentioned thickness of the placenta is meant of the common flaccid state in which we usually see it ; but when its cellular part is well filled with wax, or any fluid, the placenta is at least two inches thick. Though its figure is generally round, it is often oblong or triangular, or of an irregular shape ; and sometimes it has a small lobe or two, separated and entirely distinct from the rest. I have seen it oblong and narrow in the middle, like the cipher 8, or like the common placentæ of twins united by an isthmus. When the placenta is very long and narrow, and the navel string is inserted near one end, it is apt to remain in the uterus a considerable time after the birth of the child, and to occasion flooding and faintness before it comes away.

The outer surface which adheres to the womb, and is therefore naturally convex, is rough, tender in its substance, commonly covered with blood, lightly subdivided into smaller constituent lobes, and, to a common observer, seems to have no apparent blood vessels, at least none of any considerable size.

Its internal surface, naturally more or less concave, is glossy, hard or compact in its texture, and beautifully marked with the ramifications of the umbilical vessels. The navel string, which produces these branching vessels, is inserted sometimes into the very centre, but more commonly a little nearer the edge, and often into the very edge of the placenta. In at least four different cases, I have seen the navel string terminate on the inside of the membranes, at the distance of five or six inches from the placenta. In all these cases the umbilical vessels parted from one another even to considerable distances in their course upon the membranes, and came to the edge and inner surface of the placenta at different places, even at the opposite parts. The termination or insertion of the navel string, wherever it happens to be, makes the centre of ramification for the large vessels on the internal surface of the placenta.

Commonly there is only one centre; but in those cases where a navel string attaches itself to the membranes, there are just so many centres of ramification as there are trunks of large arteries or veins coming separately to the edge of the placenta. The internal surface of the placenta is covered with the membranes amnion and chorion, and the external with the decidua; of which hereafter.

The following peculiarity I have often observed in the placenta. Upon its inner surface, at more or less distance from the extreme border, there is a projecting brim, of the whitish colour of pleuritic blood, which gives a hollow dish-like appearance to the inside of the placenta. The membranes go off from this brim, and the circumference of the placenta is remarkably thick, forming a convex surface (part of the outer surface of the placenta) instead of a thin edge.

In considering such a placenta, it would be natural to suppose that there had been a cell or recess in the uterus corresponding to the outward convexity of the placenta. I will not pretend to explain this peculiarity, because it never occurred in any instance where I saw the placenta still adhering to the uterus. Perhaps it will be found to happen, when the ovum attaches itself near one of the Fallopian tubes, in those women who have the uterus divided at its fundus into a right and left sinuosity, corresponding to the horns of that organ in a quadruped. I have observed that such placentæ part from the uterus after labour with more difficulty, requiring a good deal of patience and cautious assistance; and frequently after all, the chorion and decidua are found to be torn from the placenta all around, and left, or a portion of them at least, adhering to the uterus.

The human placenta, as well as that of quadrupeds, is a composition of two parts intimately blended, viz. an umbilical or infantile, and an uterine portion. One is a continuation of the umbilical vessels of the fœtus; the other is an efflorescence of the internal part of the uterus.

The umbilical portion of the placenta is of a simple nature, consisting of a regular ramification of the arteries and veins of the navel string into smaller and smaller branches, without any lateral anastomosis, so that when unravelled by gentle putrefaction, motion, and washing, this part takes on the appearance of a tree whose branches divide to almost infinite minuteness, not only towards its outer surface, but every where through its substance.

The two umbilical arteries anastomose freely by a canal of communication just where they are going to branch out upon the placenta, so that by injecting one of them, the other is readily filled also. Every branch of an artery is attended with a branch of a vein; these cling to one another, and frequently, in the substance of the placenta, entwine round one another as in the navel string.

Much has been said, or supposed, about a communication between these vessels and those of the uterus; but from all the experiments I have made upon the human subject (and upon quadrupeds likewise), it plainly appears that the umbilical arteries terminate in the umbilical veins, and not in the vessels of the uterus; and that the blood passes from the arteries into the veins, as in other parts, and so back to the child again. If the placenta be whole in all its substance, which is seldom the case, and its blood vessels be pretty well emptied of their blood, any subtile injection thrown into an artery will fill the arterial system through the whole substance of the part to an amazing degree of minuteness, and return so freely by the veins as to fill them very generally and equally. In the same manner the whole umbilical systems may be filled by injecting the vein, the fluid returning from the veins into the arteries. In both these experiments the injected fluid is confined to the umbilical vascular system, none escaping at the external surface of the placenta, neither by large nor small orifices, whether of veins or arteries.

After common labours the placenta is generally more or less torn, and its vessels contain a quantity of coagulated blood ; on both of which accounts it is unfit for a successful injection. I have generally taken care, by a previous management, to procure a favourable subject, and would recommend the same method to those who have the opportunity, viz. when the navel string is tied and cut, not only allow the end of the string to bleed from the placenta, but milk it continually till the placenta comes down into the vagina ; and in taking that away, be slow, cautious, and gentle, leaving it principally to the gradual pressure from the mother, and very gentle pulling by the navel string. Thus it will neither be bruised nor torn ; and it will be almost empty of blood. Instantly put it into a bason of warm water, with the inner surface upwards. What blood remains in the vessels will still be fluid enough to be pressed from those on the surface of the placenta into, and then along the vessels of the string. Then turn up the external surface, wash and press it very gently, and clear it of all coagula, either upon its surface, or in the venal orifices ; and the whole will be almost without blood.

When a placenta is finely injected, and then steeped, and frequently washed in clean water, it is evident that the umbilical injected vessels do not reach even the outer surface of the placenta, but are only seen through a membrane (decidua) which covers all that surface. It is rough or ragged, like the inner surface of the uterus, to which it adheres, and by its whiteness becomes very distinct from the vascular injected part of the placenta, over which it is spread. It becomes still more distinguishable when the part is put into spirits, which render it more opaque and whiter.

This membrane is an efflorescence or production of the inner membrane of the uterus, and is analogous to the uterine fungi of quadrupeds. It receives no vessels demonstrable by the finest injections from those of the navel string, yet it is full of both large and small arteries and veins. These are all branches of the uterine vessels, and are readily filled by injecting the arteries and veins of the uterus; and they all break through in separating the placenta from the uterus, leaving corresponding orifices on the two parted surfaces.

This decidua, or uterine portion of the placenta, is not a simple thin membrane expanded over the surface of the part; it produces a thousand irregular processes which pervade the substance of the placenta, as deep as the chorion or inner surface; and are every where so blended and entangled with the ramifications of the umbilical system, that no anatomist will perhaps be able to discover the nature of their union. While these two parts are combined, the placenta makes a pretty firm mass; no part of it is loose or floating. But when they are carefully separated, the umbilical system is evidently nothing but loose floating ramifications of the umbilical vessels, like that vascular portion of the chorion which makes part of the placentula in a calf; and the uterine part is seen shooting out into innumerable floating processes and rugæ, with the most irregular and most minutely subdivided cavities between them that can be conceived. This part answers to the uterine fungus in the quadruped.

In a placenta of nine months, I have never been able to separate the two constituent parts otherwise than by some degree of putrefaction, and gentle rubbing and washing; but this operation always destroys the uterine portion, which is more tender, and melts down by putrefaction sooner than the other. In the placenta of an earlier age, the union of the two constituent portions is less intimate, and they may both be preserved very entire, like the vascular chorion and fungus in the quadruped. I did this operation in a conception of four months, and still preserve the uterine part attached to the inside of the uterus. I wished to give a figure of it, but the processes were so irregular and so changeable, while floating in water, that the painter could not express them; and when taken out of water, they collapsed into a smooth membranous appearance.

These two portions of the placenta are so interwoven with one another as to leave innumerable small vacuities, with free communications, through the whole substance. If this cellular structure be inflated or injected, the placenta, like the corpora cavernosa penis, acquires a very considerable increase of thickness, and subsides again when the fluid escapes. This cellular receptacle in the placenta, cannot be completely filled after it has been parted from the uterus, because then the fluid, which we may by any contrivance throw in, will be discharged at innumerable orifices on the outer surface of the placenta; but while it remains attached to the uterus, all the cells may be easily and completely filled by injecting any fluid into the arteries or veins of the uterus. These vessels, and these only, have a demonstrable communication with the spongy cells of the placenta, which receive the maternal blood from the arteries of the uterus, and give it back into the veins of that part. Both these vessels pass in the decidua, and the larger branches of both, with little or no ramification, terminate abruptly in the cells.

The arteries are all much convoluted and serpentine; the larger, when injected, are almost of the size of crow-quills. The veins have frequent anastomoses, pass in a very slanting direction, and generally appear flattened; some of them are at least as big as a goose-quill, and many of them are very small.

All around at the very edge of the placenta, there are a great number of these veins; and many of them run a little way, in the direction of tangents to the circle, in the very angle between the membranes and the placenta. When they have been filled by injection, while the placenta and membranes adhere to the uterus, and in that state are seen from the inside through the amnion and chorion, many of them appear evidently to collect their smaller branches from the adjacent parts of the decidua and of the uterus, and throw their trunks into the placenta; as if there were a disposition for bringing venal blood into the spongy cavities of the placenta, from the decidua and inside of the uterus all round the placenta.

In separating the placenta from the uterus, which is commonly practicable with the least imaginable force, all these vessels are necessarily torn through; and then each broken vessel has an open mouth upon the inner surface of the uterus, and a corresponding orifice on the outer surface of the placenta.

Notwithstanding the disputes still subsisting among anatomists, whether any blood vessels pass between the uterus and placenta, and though the texture of these vessels be so exceedingly tender that they break with the least force, they are as demonstrable in a proper subject as any vessels in the body, not only by injections, but in a fresh subject, without any artificial preparation. And any anatomist who has once seen and understood them, can readily discover them upon the surface of any fresh placenta ; the veins, indeed, he will find have an indistinct appearance from their tenderness, and frequent anastomoses, so as to look a good deal like irregular interstitial void spaces : the arteries, which generally make a snake-like convolution or two on the surface of the placenta, and give off no anastomosing branches, are more distinct. The best time for seeing them is as soon as the placenta comes away in a common labour. Let its surface be instantly washed with clean water, that all the loose blood may be removed. This renders the ground (the decidua) lighter coloured, and for that reason makes the vessels, which will still contain some dark blood, more conspicuous.

If a blow-pipe be thrust into the substance of the placenta any where, the air which is blown into the cellular part opens and rushes out readily by the open mouths both of the arteries and the veins.

While the placenta remains adhering to the uterus, any injection made by the uterine arteries fills not only these vessels, but also the cellular part of the placenta ; and if we continue the operation, the injection returns from these cells into the veins of the uterus, and fills them likewise. The same thing happens, but in an inverted order, when we begin by injecting the veins of the uterus.

Thence it is, that in injecting the gravid uterus, if we fill one system of uterine vessels fully, we can hardly afterwards get the injection to run any length of way in the other system. Therefore when we wish to have both systems pretty well injected, we must fill the first only moderately, and then the other. And when the arteries and veins of the uterus have been filled in this manner with wax of different colours, we observe, in examining the placenta, that the wax which was thrown into the first system (the arteries for example) is driven towards the inside of the placenta by the wax which was last thrown in by the other system, and which for that reason lodges itself principally in those cells of the placenta which are next to its outer surface.

While the placenta and membranes adhere to the uterus, make a slit into the coat of the navel string; there introduce a blunt probe, and force it into the cells of the adjacent part of the placenta; then withdrawing the probe, insinuate an injecting-pipe, and tie it firmly with a broad thread round the navel string. You will then find that you can by that pipe fill the whole placenta uniformly in its cellular part, and likewise all the veinous system of the uterus and decidua, as readily and fully as if you had fixed the pipe in the spermatic or hypogastric vein; so ready a passage is there reciprocally between the cells of the placenta and the uterine vessels. It is as much reciprocal, and more largely open, than between the corpus spongiosum and the veins of the penis.

From all these experiments and observations, which have been often repeated and diligently attended to, with no other desire than to discover truth, it seems incontestible that the human placenta, like that of the quadruped, is composed of two distinct parts, though blended together, viz. an umbilical, which may be considered as a part of the fœtus, and an uterine, which belongs to the mother; that each of those parts has its peculiar system of arteries and veins, and its peculiar circulation, receiving blood by its arteries, and returning it by its veins; that the circulation through these two parts of the placenta differs in the following manner; in the umbilical portion the arteries terminate in the veins by a continuity of canal, whereas in the uterine portion there are intermediate cells into which the arteries terminate, and from which the veins begin.

Though the placenta be completely filled with any injection thrown into the uterine vessels, none of the wax finds its way into any of the umbilical vessels; and in the same manner fluids injected into the umbilical vessels never can be pushed into the uterine, except by rupture or transudation.

The first time, in the year 1743, that I injected the vein of the navel string, while the placenta adhered to the uterus, in separating these two parts, it was evident that the injection had no where passed farther than the placenta, except at one place, where a small convoluted vessel (no doubt an artery) was traced, distinctly filled with wax, some little way in the substance of the uterus; but upon examination, it was evident that there was extravasation in that part of the placenta. And by many trials I know that water, or any fluid fit for transudation, thrown into the umbilical arteries or veins, readily gets into the cellular cavities of the placenta, and thence into the vessels, especially the veins of the uterus.

OF THE MEMBRANES.

The membranes of the human secundines in the latter period of utero-gestation may be reckoned three, viz. amnion, chorion, and decidua.

AMNION.

This membrane is uniformly thin, transparent, and without any visible fibres or vessels, yet its texture is firm, so as to resist laceration much more than the other membranes. It lines all the inside of both placenta and membranes, and therefore forms the bag which immediately contains the child and its circumambient water. At the insertion of the navel string into the placenta, the amnion is continued over the outside of that cord, and covers it all the way to its very beginning at the navel of the child; where, if the texture of the two parts were not so different, we might suppose the amnion and cuticle to be continued into one another.

By its internal surface, which is smooth and glossy, it is every where in contact with the liquor amnii, or child. Its outer surface adheres to the chorion by means of an intermediate, transparent, gelatinous substance, of which there is sometimes a pretty thick stratum. This connecting medium between the amnion and chorion appears to be neither fibrous nor vascular, and is so tender, that the least force or rough handling separates these two membranes, even in the most recent state of the secundines ; and if kept till putrefaction is begun, it is scarcely possible to prevent their separation. On the navel string the amnion adheres intimately to the subjacent parts without the intervention of such a jelly, except just near the placenta. There, for an inch or two, the amnion comes off from the navel string as easily as from the placenta or chorion. Whatever be the structure of the gelatinous medium, whose constituent parts are invisible by reason of their transparency, it will frequently peel off in broad laminæ, either from the outer surface of the amnion, or inside of the chorion, as if these membranes were double, or had a very tender transparent membrane between them.

The vesicula umbilicalis, of which we shall treat hereafter, is often almost invisible in the secundines of a full grown child; but when seen, it lies on the outside of the amnion, adhering firmly to that membrane either at the inside of the placenta, or on the membranes at no great distance from it. Commonly it has the same appearance as in a conception of two or three months, viz. of a very small, round, but thin white body.

CHORION.

By this membrane is here meant that which lies on the outside of, and next to the amnion. It is transparent like the amnion, but much more thin and tender. It is so extended as to make a complete bag, which incloses that membrane and all its contents; and is every where connected with that immediate involucrum of the child and water, by the gelatinous medium above described, except upon the navel string: there the amnion and chorion are intimately and inseparably connected as one membrane, of which the inner lamella is a production of the chorion.

Where it is expanded over the concave surface of the placenta, it acquires considerable thickness and strength, and is so intimately connected with the superficial branches of the umbilical vessels, that it seems to give them a coat; or they seem to run in a duplicature of its substance, till they emerge in smaller branches to disperse themselves through the different lobes of the placenta.

At the membranous portion of the secundines, the chorion adheres so firmly to the more external membrane or decidua, that it is often difficult to separate them in recent secundines. Gentle putrefaction makes them part readily: and in separating these two membranes, especially near the edge of the placenta, we may always observe a number of white slender threads, which emerge from the substance of the chorion, and ramify into smaller filaments upon the interior lamella of the decidua, which originally was the decidua reflexa. These are the remains of those shaggy vessels which shoot out from the chorion in a young conception, and give the appearance of the ovum being altogether surrounded by the placenta at that time. With a magnifying glass they appear to be transparent ramifying vessels, which run in corresponding furrows upon the internal surface of the decidua, and a good deal resemble lymphatics.

DECIDUA.

This is a membrane of a very peculiar nature, the knowledge of which throws great light upon the contents of the pregnant uterus, and upon the connection between the mother and child. It is the outer membrane of the secundines, and yet it may be said to be the internal membrane of the uterus. It is much thicker, and more opaque than the other membranes, yet still is of a more tender texture; in so much that it has scarcely a more firm consistence than a curd of milk, or coagulum of blood. It is full of small arteries and veins, often seen containing red blood, which ramify from its outer surface inwards through its substance: the principal arteries run in winding convolutions, like the coilings of a snake. It is very thin, and commonly has no perceptible blood vessels at that part which is situated near the cervix uteri; it grows thicker and more vascular towards the placenta, at the very edge of which it acquires a considerable thickness, and splitting into two strata, is continued over both surfaces of the placenta, but especially its inner smooth surface, blending itself there inseparably with the umbilical portion of the placenta.* In what sense this membrane covers the outside, or constitutes the uterine portion of the placenta, has been already explained.

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* The layer of the decidua which lies between the chorion and the placenta is in one case much thicker than in another. It sometimes forms a smooth, tender, opaque membrane; but is more frequently reticulated, especially towards the edge of the placenta, look-

The internal surface of the decidua, and its union with the chorion, was explained above in treating of that membrane. Its external surface, except what was opposite or near to the os uteri, is more or less unequal and ragged, and full of the broken ends of small arteries and veins, which come into it from the uterus. Where it is pretty thick, it is often divisible into two or more laminæ. Its outer stratum or lamella is perforated at each Fallopian tube, and at the os uteri.

This membrane is an efflorescence of the internal coat of the uterus itself; and is therefore shed, as often as a woman bears a child, or suffers a miscarriage. It is of considerable thickness, and one stratum of it is always left upon the uterus after delivery, most of which dissolves and comes away with the lochia. Frequently a thicker stratum separates from the uterus in one part, and a thinner in another; and sometimes, especially when the

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ing somewhat like lace. Occasionally there are portions of it a good deal thicker than the rest, and which shining through the transparent chorion, bear some resemblance to pieces of fat. This layer is generally thicker than that which adheres to the rough external lobulated surface of the placenta. It communicates with that other by means of the processes of the decidua, which pass between the lobules of the placenta, and along the external surface of the umbilical vessels. These processes may be evidently seen to join it, and it is probable that they contribute principally to its formation. THE EDITOR.

discharge of the secundines is hurried in a labour, the whole membranous part, both of the decidua and chorion, remain behind attached to the uterus. In separating the membranes from the uterus, we observe that the adhesion of the decidua to the chorion, and likewise its adhesion to the muscular fibres of the uterus, is rather stronger than the adhesion between its external and internal stratum, which we may presume is the reason that in labour it so commonly leaves a stratum upon the inside of the uterus.

In order to see the genuine appearance of the decidua after a labour, the secundines should be instantly well washed in warm water, to remove the loose coagulated blood, and then put into cold water, that the blood which remains in the vessels may congeal; and when the decidua happens to be well marked with blood vessels, a piece of the membranes may be spread upon white paper, and held near a strong fire till the blood changes to a blackish colour, and dries. This prevents the transudation of the red blood, which would presently render the vascular structure of the decidua indistinct, or invisible.

The number and size of the vessels which pass from the uterus to the placenta, and which are necessarily broken through upon a separation of these two parts, sufficiently account for the bleeding which has always been known to happen upon such an occasion: and we cannot longer wonder that considerable, and even fatal bleedings have happened, from a separation merely of a part of the membranes.

Though the decidua be allowed to be the outer membrane of the secundines, yet as it is really the internal lamella of the uterus, we may still retain the old language, and say, that the outer membrane of the ovum (that is of the contents of the uterus) is chorion, and that the chorion is in contact with, and adheres to the uterus.

Those anatomists who describe the human chorion as a transparent smooth membrane, without any blood vessels, are surely so far in the right; but when they apply that description to the outer membrane of the secundines, they betray a total ignorance of their subject. They can never have once looked with attention upon the fresh human secundines.

OF THE ALLANTOIS AND URACHUS.

It was very natural for such anatomists as were conversant with the secundines of quadrupeds only, to suppose that there was a human allantois, or reservoir, for the urine of the fœtus, among the secundines, with an urachus, or conduit, leading to it from the bladder: and they would more readily adopt this opinion when they observed in the human body, and especially in children, a ligamentous substance passing from the bladder to the navel, which is commonly enough called the remains of the urachus. But that men who have had opportunities of inquiring into the fact, should, in spite of the evidence of their senses, be ready to believe that man must have, because the quadruped hath an allantois, appears to be founding too much upon loose reasoning. In reality, the argument drawn from the brute creation, appears to have more force towards disproving, than towards establishing the human allantois. It might be stated thus: quadrupeds, great and small, have an allantois; in all of them the membrane itself is distinctly visible, the urachus is easily seen, any fluid thrown into the bladder passes without difficulty along the navel string, and fills the allantois; the two collections of fluid, viz. liquor amnii, and urine are seen and distinguished at first sight. From these facts we might presume a priori that there were similar appearances in the human subject, and these as much more striking in a human fœtus, than they are in a kitten, as that is larger than this. But in fact none of those appearances are seen in the human subject, and therefore we must conclude that the similar parts do not exist.

Among all the dissections which I have made of the gravid uterus, and of conceptions which have been thrown off in an entire state (except in very young conceptions, when the vesicula umbilicalis is turgid), I have never seen any thing like two distinct bags of water; nor any membrane between the chorion and amnion; nor any passage leading from the bladder along the navel string to the rest of the secundines. These observations give me a conviction that there is no human allantois. What there is in the very early part of pregnancy beside the blood vessels above described, is not now the question. Neither have I ever seen in the human subject, any thing like omphalo-mesenteric vessels, or any membrane analogous to that in a dog or cat, through which these vessels are distributed.

OF THE LIQUOR AMNII.

The liquor amnii is the fluid which lies immediately round the body of the child and navel string, taking its name from the membranous bag which incloseth it. The quantity of this fluid is very different in different cases. In one dissection at the full time, I found little more than half a pint. In many labours I have been convinced from the appearance upon the linen that it did not amount to so much. And it is notorious to practitioners in midwifery, that frequently several quarts at least, are discharged at the birth of a child. I should guess that there may be commonly, upon an average, about two pints or more.

It is quite fluid, that is, without any sensible degree of tenacity, or ropiness, pretty transparent; although sometimes a little foul or muddy, and has a little of the yellowish cast in colour. In labours it is frequently very thick, and of a foul green colour; in which case the secundines are always stained with the same foulness. This I believe is always owing to a mixture of the child's meconium. When the liquor amnii is all bloody in labour, we may be pretty sure that the child is dead. This colour is owing to the transudation of red blood.

It does not coagulate with heat like the serum of blood, but grows more opaque and muddy, as if there were a very small part of such a fluid in its composition. Occasionally the quantity of coagulable matter in the liquor amnii, is nearly as great as in the water of ascites; which is most readily shewn by applying to it some of the common acids, such as the nitrous or muriatic.

To the taste it is always very sensibly saltish: and a considerable quantity of common salt may be obtained by evaporating a large quantity of the liquor.

OF THE CHILD.

The fœtus in utero is naturally contracted into an oval form, adapted to the figure and circumstances of its habitation. The vertex of the head makes one end of the oval, and the nates the other. One side or edge of the oval, is formed by the occiput, the back part of the neck, and the incurvated trunk ; the other is made by the forehead and the mass of contracted and conglomerated limbs. The chin is close to the breast, the trunk is bended forwards, the knees are close to the fore parts of the hypochondria, the legs drawn to the back parts of the thighs, the feet, or lower part of the legs decussating each other ; and the upper extremities contracted into the vacant space betwixt the forehead and knees. The most common situation of the extremities is not to be determined, as they are found to be a little different in different dissections ; and in the living body they vary almost every moment : thence the hands are seen indiscriminately on the head or face, or across one another, or round the knees, or legs ; and the legs are sometimes extended, and the feet are placed by the face;

or one is in that position, and the other contracted, and the foot downwards.

The navel string, in passing from the child to the placenta, is often variously entangled with the extremities, and frequently winds once or oftener round the neck.

When there is a considerable quantity of liquor amnii, the child takes the advantage of room, and the composition of its parts is not so close or globular. In proportion as there is less room, its figure is more compacted and moulded to the shape of the cavity of the uterus. In two different cases which I examined, there was so little fluid surrounding the child, though the waters had not been discharged, that the uterus had pressed and moulded all parts of the child into a very ugly form, as if it had been made of dough ; and in such cases the hands, and more particularly the feet, are liable to be compressed and twisted into deformity, on account of their being projecting, or pliant parts.

When a child is newly born, and left unconfined, however it may fling its limbs in starts, yet for the most part, when quiet, it gathers itself up into the oval form, as it lay in the womb. Were it not for art, this natural habit would be preserved ; and man would take rest like the quadruped, with all his limbs folded up.

From want of room in the uterus, and some accidental awkward situation of the parts, children are sometimes born with such apparent deformity in their hands or feet, that nurses, and people of a higher rank in other respects, but upon a perfect equality with them in natural knowledge, are frightened, and believe it to be a monstrous, or incurable deformity.

With regard to the mother, the most common situation of the child by far is, with its head downwards, and its nates at the upper part of the uterus. Once perhaps, in twenty or thirty cases, it is the contrary, and presents, as they term it in midwifery, with its posteriors. All the observations that I have been able to make in dissections, and in the practice of midwifery, would persuade me that the child's head is naturally downwards through all the later months of utero-gestation: and that neither reason nor instinct teaches it, at a particular time, any trick of a tumbler or rope-dancer.

Whether the child's head be downwards or upwards, the back parts of the child are commonly turned more or less towards one side of the mother, and its fore parts in proportion towards the other; so that more of the child lies in one side of the mother than in the other; and this is sometimes the right side, and sometimes the left. In the dissections of gravid uteri which have fallen to my lot, it has so happened, that whenever the placenta adhered not to the middle, but to one side of the uterus, the child's limbs were towards the placenta, and its body and back in the opposite side of the womb.

The reason of the situation of the child with respect to the mother, seems to arise from several circumstances. The internal surface of the amnion is smooth and slippery; and in proportion to the growing body of the child, the space is gradually diminished. This diminution of space renders the oval figure of the child more compact, and together with the oblong figure of the uterus, determines the long axis of the oval to become vertical. The uterus being broader from side to side, than from the fore part to the back part, and the child in its oval figure being more narrow from side to side, than from the fore part to the back part, the shape of the uterus again will fix the situation of the child, so that its fore parts shall be rather to one side of the mother. So I have always found in the dead body, and so I believe it generally is when the mother is alive.

In the particular case of a very small child, in proportion to the quantity of the liquor amnii, I should suppose that it is, or may be otherwise. In such a case, there will be so much space for the child, that even where the larger diameter of the child coincides with the smaller diameter of the uterus, there will still be no want of sufficient room; and therefore the child will alter its situation as the posture of the mother, or its own motions may direct. An ingenious friend of mine objected to this doctrine, that probably the posture of the dead subject might be the occasion of the child being commonly found, upon dissection, with its back towards one side of the mother. But, however the child might be supposed to be situated in those cases where there is a great quantity of liquor amnii, that its back is commonly turned to one side of the mother, is confirmed by the following observations. First, in most cases small projecting parts, like knees or elbows, may be felt through the parietes of the abdomen in any posture of the mother; which could hardly be, if the child's back lay directly forwards. In the last place, I have observed in several, but especially in two cases of dissections, that the child was so compacted for want of room, and so embraced by the uterus, though the waters had not been discharged, that it could not possibly have varied its situation; and in all these cases the back of the child was turned towards the side of the mother.

The reason why the child's head is commonly downwards, may be supposed to be this: the child is specifically heavier than the liquor amnii, and therefore in the various attitudes of the mother, is always in contact with, and supported upon the depending part of the uterus. This, in the more common attitudes, is the cervix uteri. The child's head, and upper part of the trunk, contain more matter in proportion to their surface, than the lower part of the body. Thence the head will more generally fall down to the lower part of the uterus. And for the same reason, were a child to be dropt into deep water, in various postures and directions, its head would always first reach the bottom. But the motion of the head itself, either alone, or in co-operation with the attitude of the mother, may sometimes turn the head towards the fundus uteri.

In the last two or three months of gestation, the child is commonly so much straitened for room, and so compactly adapted to the oblong figure of the uterus, that it cannot change its general position either by its own efforts, or even by accidents happening to the mother. At this period it is frequently evident, that some awkward straitened position of the child being produced by its own motion, and pressing or stretching the uterus unequally, gives the mother much uneasiness for a time. And then, upon the child's stirring in some remarkable way, it gets to be more at its ease, and the mother feels instant relief from the pain, the stretching, or whatever the complaint was. This will happen to the same woman again and again.

OF THE SIZE AND FORM OF THE CHILD.

The size and weight of a child's body at birth, I believe, is generally over-rated in this country; in so much that we are often told, even by those who ought to know, of children weighing from fifteen to twenty pounds. So far is this from being true, that I never knew an instance of a child which weighed twelve pounds, and the greatest number are little above half that weight. Dr. Macaulay was at pains in our hospital to ascertain the ordinary bulk of new born children, by first weighing a great number indiscriminately as they were born; and then by giving an order to our matron to weigh occasionally all such as were of a remarkable size in either extreme. Of several thousands born in the British Hospital, at their full time, while the Doctor's order was attended to, the smallest weighed above four pounds, the largest eleven pounds two ounces, and by far the greater number weighed from five to eight pounds, avoirdupois.

The shape and proportion of the parts of a child's body are very different from those of an adult. Without descending to minutiæ, it must be observed that the head is very small in proportion to the trunk; and the lower part of the body when compared with the upper. Thus the upper part of the trunk of the body is small with regard to the head, the lower part of the trunk is small in proportion to the upper part, and the lower extremities are small in proportion when compared with the arms.

Some children are so clean, that when born they hardly require being washed: but for the most part their skin, particularly on the head and back, is coverēd with a crust of a white greasy mucus, which will not wash off with plain water. Sometimes this mucus is as fluid as honey, and in great quantity, but more commonly it clings to the skin like a thin besmearing plaster.

It has been thought by some people, a deposition or settling upon the child from the liquor amnii. But I should rather presume that it is a collection of the cutaneous discharges of the fœtus itself; for the following reasons. It is more greasy or unctuous, and of a more opaque and white colour, than might be expected in any settlement from the liquor amnii. Besides, we never see any similar deposition on any part of the inner surface of the amnion, or upon the navel string. In the last place, we see that this mucus collects in the groins, arm-pits, hams, &c. in such children as lie so compacted and folded up, that these parts of their skin are not exposed to receive any settling from the liquor amnii.

After this account of such things relating to the body of the child as are external, an examination of its internal peculiarities would naturally follow. The most important of these are, what we may suppose absolutely necessary to the life of the child while it draws its nourishment from the mother, and cannot enjoy respiration, viz. the communication between the pulmonary artery and the aorta; the continuation of the internal iliac arteries to the navel, where they form the arteries of the navel string and placenta; the continuation of the vein of the navel string from the navel to the liver, where it meets with, and is continued into the left branch of the vena portarum hepatica; the canal of communication between that anastomosis and the trunk of the left vena cava hepatica; the foramen ovale with its valve, in the partition between the two auricles of the heart; and the compact state of the lungs, which have not as yet received air. Besides which, there are many things in the child different from what they are in the adult, though of less importance, and less connected with that way of life which is peculiar to the child before its birth.

But as opportunities of dissecting subjects which are proper for these inquiries have been frequent, anatomists have left little to be added to their observations upon this branch. Wherefore we shall now pass it over, that our time and expence may be employed about such things only, as require subjects and occasions which few anatomists can procure.

OF THE UTERUS AND ITS CONTENTS IN THE EARLIER MONTHS OF PREGNANCY.

The most early case of pregnancy which I have had an opportunity of examining in the dead body, was of three complete months. With regard to the uterus itself, and its exterior appendages, I cannot go farther back into pregnancy; but with regard to its contents, I can go as far as the sixth week, having examined with great attention innumerable fresh miscarriages which happened between that time and the end of the third month. And when I have compared and connected all these observations, and joined them to what I have seen in the dissection of several cases in the fourth and fifth months, which have fallen to my lot, it must be allowed that I have had very favourable opportunities of knowing the state of the pregnant uterus even in the earlier times of gestation.

In the third and fourth months the substance of the uterus is become more soft than before conception, and all its vessels being proportionably enlarged, it appears to be much more vascular. We may therefore reasonably believe, even if we knew nothing from dissections of quadrupeds, that the uterus changes its nature in that respect from the time of conception, and receives a greater quantity of blood. Its thickness is only a little increased in its natural state, but considerably when the veins and arteries are artificially distended with any fluid.

At this time the conception is lodged entirely in the fundus uteri, or in that part which in the unimpregnated state has a smooth internal surface; no portion of the conception stretching then down into the cervix uteri, or that part of the uterus which is narrow and rugous within.

The cervix uteri remains contracted and hard in its substance, and contains a tough and firm jelly, which cements and fills up its cavity so completely, that upon attempting to push a probe through it, the probe will as readily force its way through the hard substance of the uterus itself, as through the cementing jelly. When the uterus is kept a considerable time in water, six or eight days perhaps, this cementing jelly swells, grows in proportion softer, and at last comes away, or falls off in one mass. Then the internal surface of the cervix exhibits a most beautiful appearance; being variegated with projecting rugæ, and innumerable intermediate narrow, but deep cavities, which lodged so many processes of the jelly. In separating the jelly, when by previous maceration it had been fit for such an operation, I have seen these processes drawn out of the little cavities as distinctly as we can see a hand drawn out of a glove: and when the jelly is carefully separated and floated in clear water, it preserves its figure, and exhibits a most elegant appearance, produced by the processes that shoot out from its surface all around.

The os uteri, or the very extremity of the uterus, is in some women narrow or pointed, with a very small orifice, that will just admit the point of a very small finger; and in some it is large, soft or spongy to the touch, granulated upon its surface, and the orifice so wide as to admit the end of the finger full half an inch up with great ease. There the passage becomes narrow, and is closed with the gelatinous cement. The os uteri, all around its passage, is crowded with small cavities, containing the same sort of jelly, which by maceration swells, pushes out from the cavities, and comes away, leaving the cells void. This, no doubt, is part of the jelly which naturally comes away in labour. Some women have much more of it than others; and in comparing different dissections, I have observed more of the jelly within the cervix uteri, and more likewise in the cells round the os uteri, in one subject than another.

The uterus at the time of three or four months, is by no means so tightly filled but that it would easily contain more. It is like a bladder therefore, so filled with water, that it would easily contain a third part more. Thence it is soft and swagging, and easily changing its shape, accommodates itself to the neighbouring parts.

The situation of the uterus, which at first is in the cavity of the pelvis, but afterwards gradually rises up into the cavity of the abdomen, and the changes which its ligaments undergo, may be easily conceived by any person acquainted with the state of those parts before conception, and who has considered what, in a former part of this work, was said upon the same things in the ninth month of pregnancy.

The peculiarities of the ovarium are very different at the different periods of utero-gestation. In the earlier months the corpus luteum is considerably larger and more vascular; and within it there is a considerable and evident cavity, containing a fluid. When the uterine vessels have been injected, I have observed that the wax very easily extravasates into that cavity. On the outside of the ovarium there is a little pit, which looks like a hole, leading into the cavity of the ovarium. But in the cases which I have seen, no bristles would pass; it appeared to be an obliterated duct, or passage grown together.

The contents of the uterus, and the membrane which I have called decidua, are very different in the first months of pregnancy from what they are in the end of it. I shall take them in their order.

AMNION.

In the second and third months, the amnion is much the same sort of membrane as in the later months of utero-gestation; only it is much more delicate and transparent, and its gelatinous union with the chorion still more tender.

In the very early state of an ovum, the amnion forms a bag, which is a good deal smaller than the chorion, and therefore is not in contact with it. In the course of some weeks, however, it comes nearly into contact with the chorion, and through the greater part of pregnancy the two membranes are pretty closely applied to each other. These changes shew that at the very first the chorion has a quicker growth than the amnion, unless it be supposed that the amnion begins to be formed some little time after the chorion; that soon the amnion acquires a quicker progress of growth than the chorion, and that at length they keep exact pace in their growth with each other.

VESICULA ALBA.

The little bag situated on the outside of the amnion, which I shall distinguish by this name, is commonly more apparent at this age than in the later months, from the white opaque colour of the fluid which it contains being more distinguishable upon the very transparent membranes. It is a small oval bladder, transparent, and containing a very small portion of a cream-like fluid, which may be easily pressed into any one part of the bag: the bag will there be made turgid, and by continuing the pressure it will burst, and the fluid be scattered. From this bag a small duct is continued to the navel string, which evidently grows smaller as it runs on. It sometimes evidently contains the same sort of white fluid as the bag itself, which may be pressed forward and backward with the point of a needle. When the duct comes to the navel string, it is as small as the finest hair, and with magnifying glasses may be seen running the whole length of the string. In its whole course, both among the membranes, and on the string, it adheres closely to the amnion: it is however frequently invisible. The distance of the vesicula from the navel string is various, being sometimes half an inch, and sometimes twice or three times as much.

CHORION.

In the early months of utero-gestation, this membrane is very different in several respects from what it is in the last months.

First, the membrane itself is considerably stronger than the amnion, so that in the progress of the nine months, the proportional strength of the amnion is increasing, while that of the chorion is diminishing; for the amnion is the strongest membrane in the last months.

Secondly, in the first months the chorion is uniformly or equally strong in all its parts; whereas in the last months, that portion of the chorion which lines the placenta, is many times thicker and stronger than the portion which makes the membranous part of the secundines.*

Thirdly, when the chorion with its contents, and all the shaggy vessels hanging from its external surface (which has been commonly called the ovum) is separated from the inclosing decidua, there is no apparent difference, in a very early conception, between the outer surface of one part and another. The whole is at this period equally covered with shaggy vessels, but very soon that part of the surface of the chorion, which is not to contribute to form the future placenta, becomes smooth. This change begins commonly at a point, and gradually spreads to the edge of what afterwards becomes the placenta, till the shaggy vessels are removed, and that part of the chorion then appears a smooth transparent membrane. Occasionally a few straggling roots of the shaggy vessels are left still remaining. There would seem to be some variety as to the exact time of this change, for we find one ovum considerably larger than another before any of the shaggy vessels have at all disappeared ; but they are generally gone at the end of a few weeks.

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* Here ends the Manuscript of Dr. Hunter, except that what is afterwards said about the navel string is also of his writing. The Editor has taken the liberty of transposing this from the place where it was, to another which appeared to him more proper for it.

By what process these shaggy vessels disappear, it would be extremely difficult to conjecture, unless by absorption ; and if this be the case, then absorbent vessels must exist in the structure of the secundines, a circumstance which has not yet been demonstrated, and which, from the nature of the parts, can hardly admit of this decisive mode of evidence.

DECIDUA.

In ova of a few weeks growth, the membrana decidua is more distinct for examination, than in the more advanced periods of pregnancy, and is different in several circumstances. It is a very soft, tender, pulpy membrane, which lines the whole cavity of the fundus uteri, reaching to the beginning of the cervix, and passing a little way within the origin of the Fallopian tubes, at which places it is perforated by small openings.* It is very irregular in its thickness, some parts being thicker than a crown piece, and others of extreme thinness; but this is subject to a good deal of variety in different persons. In the more advanced periods of utero-gestation there is not so much variety in the thickness of the different parts of the decidua, but it is then a thinner and much more uniform membrane.

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* In a case of very early conception, probably not more than two weeks, which was examined by Mr. Hunter, the decidua was found, upon opening the uterus, to be as fine at the beginning of the cervix as the retina, but without any hole in it there. This, perhaps, always takes place in a very early conception, where the ovum remains undisturbed in the uterus; but where it passes off in a miscarriage, the decidua at the cervix is perforated. In more advanced pregnancy, that part of the decidua which lines the inner surface of the uterus, and which will in the progress of the description be distinguished by the name of the decidua vera, seems to lose itself at the beginning of the cervix, and has evidently there an opening. The decidua which covers the external surface of the chorion becomes gradually thinner as pregnancy advances, but has no opening in it at the cervix uteri, or any where else.

The inner surface of the decidua, which comes immediately into view when the cavity of the uterus is laid open, is at an early period of pregnancy smooth ; but the outer surface of the decidua, which is in immediate contact with the uterus, has shooting from it a prodigious number of little processes or flocculi, giving it a very irregular appearance. In the more advanced stages of pregnancy, there is little apparent difference to the eye between the outer and the inner surface of the decidua, these flocculi being hardly observable. The adhesion too of the decidua to the uterus, at an early period of pregnancy, is not so strong as when pregnancy has made a further progress.

Besides that portion of the decidua lining the cavity of the fundus uteri, which Dr. Hunter used to call, by way of distinction, the decidua vera, another portion forms an external covering to that part of the chorion, which is not in contact with the inner surface of the placenta. This was discovered by Dr. Hunter, who called it the decidua reflexa. It is a membrane of considerable thickness, and is sometimes of a yellower colour than the decidua vera.* The ovum lies between a part of the decidua vera and the decidua reflexa, both of which unite into one membrane at the edge of the placenta ; or the decidua vera divides itself at the edge of the placenta into two laminæ, one of which passes between the placenta and the inner surface of the uterus, and the other forms the decidua reflexa, which covers the outer surface of the chorion. The decidua enveloping the ovum, does not however merely cover the shaggy vessels of the chorion at their outward floating extremities, but also the whole of their external surface, as deep as the chorion. The chorion itself commonly appears transparent, and not covered by any layer of decidua immediately applied to it. It sometimes, however, although I believe very rarely, appears to be distinctly covered with a thin layer of decidua, and therefore in those cases where it seems to be wanting, it may not improbably be supposed to be so very thin as to escape observation. What is now said, however, is to be considered as merely conjectural.

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* If it did not lead to some risk of producing an erroneous opinion with regard to the formation of the decidua, I think it would be better to call the decidua vera by the name of the decidua uteri, and the decidua reflexa by the name of the decidua chorii. This would render it more easy to acquire a clear idea of the whole membrane.

Where the decidua reflexa is beginning to pass over the chorion, there is, at an early period of pregnancy, an angle formed between it and the decidua, which lines the uterus; and here the decidua is often extremely thin, and perforated with small openings, so as to look like a piece of lace. In proportion as pregnancy advances, the decidua reflexa becomes gradually thinner and thinner, so that at the fourth month, it forms an extremely fine layer covering the chorion. It comes at the same time more and more closely in contact with the decidua, which lines that part of the uterus to which the placenta is not fixed, till at length they adhere together. One might naturally be led to suppose, that this part of the decidua, after its junction with the decidua reflexa, should become a thicker membrane than it was originally. This however is so far from being the case, that it is really thinner. The decidua reflexa, being very thin before it is joined to it, can produce little additional thickness, and the decidua which lines the uterus is gradually made thinner in the progress of pregnancy by distension, and perhaps too by some degree of absorption.

The decidua resembles a good deal in its appearance, as well as in its mode of formation, the lamina of coagulable lymph which is formed by inflamed surfaces. Both membranes are of a yellowish white colour ; both are tender, pulpy, and vascular. The lamina of coagulable lymph is formed by an inflamed membrane ; the uterus before the decidua is formed becomes much more vascular, so as to change into a state somewhat analogous to inflammation. The points of comparison, however, between those two membranes reach no farther. The lamina of coagulable lymph is gradually changed into the membrane of adhesion, which resembles exactly the common cellular membrane, of the body ; but the decidua continues throughout a peculiar membrane.

How the decidua envelopes the ovum has never yet been observed, and therefore can only be a subject of conjecture. The most probable supposition is, that the ovum passes from the ovarium into the cavity of the uterus, while the coagulable lymph is pouring out by the arteries of the uterus, which is afterwards changed into decidua. One can hardly imagine that the ovum should make its way into the middle of a membrane, which is already formed, and though tender, yet capable of some degree of resistance. In two examinations, however, which I have known to have been made with care, at a very early period of pregnancy, where the decidua was already formed, no ovum could be discovered. But this circumstance I consider as invalidating very little the probability of the supposition which has just been made, because it is natural to think, that at a very early stage of pregnancy the ovum is so small, as to be detected with great difficulty.

Although it be extremely probable, that the decidua begins to be formed at the time that the ovum passes into the cavity of the uterus, yet it is not absolutely necessary for the formation of the decidua that the ovum should reach that cavity. When an ovum grows in the ovarium or the Fallopian tube, the decidua is both formed in the uterus, and the uterus is considerably enlarged, so as to undergo, to a certain degree, changes exactly similar to those which take place in natural pregnancy.

PLACENTA.

In a very young ovum there is no appearance whatever of the placenta. The whole outer surface of the chorion is covered with shaggy vessels, and that part which will afterwards contribute to form the placenta is not more covered than the rest. In the course of a few weeks, more than one half of the surface of the chorion becomes smooth, and the remainder continues to be covered, as before, with shaggy vessels. These vessels are covered at their floating extremities with the decidua, and even their whole external surface is covered with it as deep as the chorion itself. Here then are the two parts which constitute the placenta; the fœtal, formed by an extension of the vessels of the chorion, which are derived from the umbilical vessels; and the maternal, formed by the decidua.* These are for some time separable from each other, but they gradually become so intimately connected, that all disunion is impossible, and at the same time the placenta becomes gradually firmer in its texture. At what exact time this intimate connection becomes complete, it is very difficult to ascertain, because it is very difficult to find an opportunity of examining miscarriages at a near gradation of age with respect to each other.

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* All the shaggy vessels hanging from the outer surface of the chorion, are probably not blood vessels. It is natural to think that some lymphatics may be interspersed; but these have not hitherto been demonstrated.

Some favourable circumstances too, or a greater dexterity, may make the maternal and infantile portions of the placenta separate from each other, at the same age, more easily in one case than another, which will render this point still more difficult of determination. Dr. Hunter has mentioned, that he has separated the two parts from each other in a placenta of four months; but a placenta even considerably before this period, has very much the same appearance of structure to the eye that it has afterwards. It would seem that in the early months, even although the placenta has acquired the common appearance of structure, the maternal and infantile portions are not so very intimately connected together, as in the more advanced periods of pregnancy.

NAVEL STRING.

Till some such time as the sixth or seventh week, there is nothing to claim the appellation of navel string. The belly of the fœtus, at its most projecting point, is close to the amnion and other involucra; and there the vessels of communication pass. From this time the navel is gradually drawn out or formed. About the seventh week (the age of the most common abortions, viz. such as are generally excluded in the eleventh or twelfth week) the navel string is usually about an inch long, and straight, that is, without any twisting, either of the whole cord, or of the vessels round one another. It is likewise very thick in proportion to the vessels, which run straight like slender threads in the transparent gelatinous substance of the string. In very fresh subjects they contain red blood; in others (and in all after being kept some time), they appear like opaque white threads. Besides the umbilical vessels, the fine white thread which comes from the white vesicula upon the outside of the amnion, is often visible along the whole length of the navel string. At this age it is very common to see some convolutions of the intestines lodged in the beginning of the cord. About the tenth week the navel string is become proportionably more slender, and so much longer, that commonly it makes loose turns, instead of running straight from the fœtus to the placenta; and it is often much twisted like a rope.

FŒTUS.

At what exact time the fœtus of an ovum becomes visible, it is extremely difficult to determine, because it is almost always impossible to ascertain the date of the impregnation. I should believe, however, that the fœtus is visible before the end of the fourth week, because we find that it has made considerable progress in its growth, at the usual time of ova dying in miscarriages, which is about the seventh week.*

The fœtus at this period consists of two oval masses, viz. the head and the trunk, of which the former is commonly smaller and rounder than the latter. Occasionally the head is, at this period, even larger than the body. The head is bent forwards upon the breast; and although there is a narrowness, yet there is no distinct appearance of the neck. The eyes form the most conspicuous feature, appearing each of them like a very small dark circle, which surrounds a white central point. They are placed at a great distance from each other, and low down in the head. The mouth is, at this period, generally very wide, with the tongue very obvious at the lower part of it, and the two lips are hardly begun to be formed. The nose is obscurely marked, and still more so are the external ears, which appear, upon attentive examination, like two small circles gently hollowed, near the angles of the mouth.

The body commonly forms a larger and a longer oval than the head, with the lower part of the spine curved round towards the belly, so as to resemble somewhat the tail of a quadruped when thrown between the hind legs. The upper extremities sprout

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* Since this was written, Dr. Combe has shewn me a preparation where there is the appearance of a fœtus, although extremely small, and where, from peculiar circumstances, the conception has been ascertained to be twenty-two days old.

out from each side of the chest, and are directed obliquely towards the chin; the lower extremities sprout out in the same manner from the lower part of the trunk, and are considerably smaller at this period than the upper. These proportions of the head to the trunk, and of the upper to the lower extremities, change very much in the further growth of the fœtus within the uterus; the head becoming relatively much smaller, and the lower extremities becoming larger. After birth, however, a further change takes place, for there is a great difference between the proportion of these parts to each other in a child at birth, and in an adult.

THE END.